



FROEHLING & ROBERTSON, INC.

Engineering Stability Since 1881

310 Hubert Street
Raleigh, North Carolina 27603-2302
T 919.828.3441 | F 919.828.5751
NC License #F-0266

October 16, 2017 (revised February 5, 2018)

North Carolina Department of Transportation
Geotechnical Engineering Unit
1020 Birch Ridge Drive
Raleigh, North Carolina 27610

Attn.: Mr. Gordon Box, L.G.
GeoEnvironmental Project Manager

Re: State Project: R-2530B
WBS Element: 34446.1.6
NC 24-27 from Bird Road in Albemarle to West of the Pee Dee River

Subject: Preliminary Site Assessment
Parcel #086 – Thaddeus A Furr (Min O Pon)
44022-C Highway 24/27 East
Albemarle, North Carolina
F&R Project #66V-0092

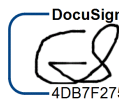
Dear Mr. Box:

Froehling and Robertson, Inc. (F&R) has completed the authorized Preliminary Site Assessment at the Thaddeus A Furr property located in Albemarle, North Carolina. The work was performed in general accordance with F&R's Proposal No. 1866-00132, dated June 14, 2017 (and revised June 22, 2017). Notice to Proceed was issued to F&R on July 6, 2017. This report documents our field activities, presents the results of laboratory analysis and provides estimated quantities of petroleum impacted soils.

Please do not hesitate to contact us if you should have any questions regarding this report.

Sincerely,

FROEHLING & ROBERTSON, INC.

DocuSigned by:

4DB7F275EBFD410...

Clint E. Sorrell
Environmental Scientist



Benjamin A. Whitley, P.E.
GeoEnvironmental Services Manager



PRELIMINARY SITE ASSESSMENT

Thaddeus A Furr (Parcel #086)

Min O Pon

44022-C NC 24/27 East

Albemarle, North Carolina

State Project: R-2530B

WBS Element: 34446.1.6

F&R Project #66V-0092

October 16, 2017 (revised February 5, 2018)

Prepared for:

North Carolina Department of Transportation

Geotechnical Engineering Unit

1020 Birch Ridge Drive

Raleigh, NC 27610



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**Preliminary Site Assessment Report
Thaddeus A Furr Property (Parcel #086)
Albemarle, Stanly County, North Carolina
F&R Project No. 66V-0092**

1.0 Introduction

Froehling and Robertson, Inc. (F&R) has prepared this Preliminary Site Assessment (PSA) Report to document soil assessment activities performed at the Thaddeus A Furr Property addressed as 44022-C Highway 24/27 East, in Albemarle, Stanly County, North Carolina. The site is located approximately 2,300 feet east of the NC 24/27 and Sweet Home Church Road intersection as shown in Appendix I, Figures 1 and 2. As indicated in the Request for Technical and Cost Proposal (RFTCP), the site operates as an existing restaurant (Min O Pon). According to the NCDEQ UST Section Registry, the site has been assigned Facility ID # 0-209440. Two USTs were closed out in 1993, one in 1994, and two in 2010. In addition, the site has three Incident Numbers (27172, 36809, and 86820) that have been closed out in various phases from 1996 to 2012. The RFTCP indicates the site previously operated as a gas station and restaurant, and a current tank bed is located just east of the building. In addition, a groundwater monitoring well previously observed, but its location was not provided.

According to the NCDOT within their RFTCP, acquisition of right-of-way is necessary for the proposed NC 24-27 design. As such, the NCDOT requested a PSA be performed to assess the possibility of encountering petroleum impacted soil from known or unknown USTs which may exist within proposed easements and right-of-way at the project site.

The PSA was performed in general accordance with F&R's Proposal No. 1866-00132, dated June 14, 2017 (and revised June 22, 2017) with Notice to Proceed issued to F&R by the NCDOT on July 6, 2017. The purpose of this report is to document field activities, present the results of laboratory analysis, and provide estimated quantities of petroleum impacted soils.

The existing on-site structure is two-stories in height and is presumably of wood construction. A fuel dispenser canopy is located northeast of the on-site building. The remainder of the site consists of an asphalt paved parking lot and grass/asphalt medians. The site is bordered to the north by NC 24/27; to the south by wooded land and scattered residential development; to the east by NC 24/27; and to the west by wooded land and residential development. Access to the site is gained from NC 24/27 to the north and east.



2.0 Geophysical Survey

Prior to F&R's soil assessment activities, Pyramid Environmental & Engineering, P.C. (Pyramid) conducted a geophysical survey to locate suspect metal underground storage tanks (USTs). The geophysical work was conducted from July 25 to July 26, 2017, and was performed within the proposed utility easement (PUE) of NC 24/27.

The geophysical investigation consisted of electromagnetic (EM) induction surveys using a Geonics EM61 instrument. Ground-penetrating radar (GPR) investigations of selected EM61 anomalies were investigated using a Geophysical Survey Systems UtilityScan DF unit equipped with a dual frequency 300/800 MHz antenna. The EM61 data was collected along parallel survey lines spaced approximately 5 feet apart. The data was reviewed in the field to evaluate the possible presence of USTs and later transferred to a desktop computer for further review. Isolated EM anomalies were identified on the site, including reinforced concrete, a mailbox, a canopy, debris, utilities, and a sign. In addition, three probable metallic USTs was identified just northwest of the on-site building. The GPR data suggest that the top of the probable USTs are approximately 2 to 3 feet below ground surface (bgs). Pyramid estimated the three probable USTs are each 5 feet in diameter and 12 feet long, which is approximately 1,700 gallons in size.

Based on the EM and GPR geophysical data collected at the site, Pyramid identified three anomalies that were interpreted to be three probable metallic USTs within about 2 to 3 feet of the ground surface. F&R notes that the westernmost UST is partially on the PUE. The complete geophysical report is attached as Appendix II.

3.0 Site Assessment Activities

F&R visited the site on August 16, 2017 to perform the Preliminary Site Assessment. The assessment consisted of advancing 10 borings into the soils at the project site using direct-push technology (GeoProbe). The boring locations were determined by F&R staff based on the results of the geophysical survey, site features and proposed construction activities. Seven of the borings (B-1 through B-7) were advanced on the northern portion of the site adjacent to NC 24/27. Borings B-8 through B-10 were advanced on the northwestern portion of the site adjacent to the three probable metallic USTs. F&R attempted to advance the borings adjacent to NC 24/27 (B-1 through B-7) to the proposed depth of 10 feet bgs and the borings adjacent to the USTs (B-8 through B-10) to the proposed depth of 12 feet bgs. However, Borings B-1 through B-6 were terminated at depths ranging from 2 to 9.5 feet bgs and Borings B-8 through B-10 were terminated at depths ranging from 6 to 7 feet bgs, where GeoProbe refusal was encountered.



Photos detailing existing site features are attached as Appendix III and boring locations are depicted in Figure 3 of this report.

Soil sample cores from the borings were collected in disposable, 4-foot long acetate sleeves. The soil samples were visually/manually classified and screened in the field using a calibrated photo-ionization detector (PID) for evidence of petroleum hydrocarbons. Evaluation of VOC concentrations were performed using a MiniRae 3000 PID which produces results in parts per million (ppm). A representative soil sample was collected from two foot sections of each sleeve and placed in a re-sealable plastic bag. The vapors were then allowed to equilibrate in the headspace of the bag for approximately ten minutes prior to measurement with the PID. The measurements were collected by placing the probe tip into the headspace of the bag. PID measurements can be found in the GeoProbe Logs in Appendix IV, as well as in Table 1 in Section 5.0 below.

Generally, the soil sample in each boring which exhibited the highest PID concentration was submitted for laboratory analysis for diesel range organics (DRO), gasoline range organics (GRO), Total BTEX (benzene, toluene, ethylbenzene and xylenes), 16 PAHs (polycyclic aromatic hydrocarbons) and BaP (Benzo(a)pyrene) by Ultraviolet Fluorescence (UVF) technology (RedLab QED Hydrocarbon Analyzer).

The samples were collected in laboratory-supplied sample containers, placed in a cooler with ice, and shipped via UPS to RedLab in Wilmington, North Carolina following standard chain-of custody procedures.

4.0 Subsurface Conditions

As indicated in the attached GeoProbe Logs (Appendix IV), subsurface conditions from existing ground surface to boring termination primarily included various layers of dry-moist-wet, red-orange-brown-gray-tan silty sandy clay, and moist gray clay with pebbles and stone. F&R attempted to advance the borings adjacent to NC 24/27 (B-1 through B-7) to the proposed depth of 10 feet bgs and the borings adjacent to the USTs (B-8 through B-10) to the proposed depth of 12 feet bgs. However, Borings B-1 through B-6 were terminated at depths ranging from 2-9.5 feet bgs, and borings B-8 through B-10 were terminated at depths ranging from 6 to 7 feet bgs, where GeoProbe refusal was encountered due to interbedded layers of dense clay with stone and pebbles.

PID readings generally ranged from 0.2 to 7.5 ppm. However, elevated VOC readings (500 ppm) were measured at Boring B-8 between 4 and 6 feet bgs. Petroleum odors were also observed in



Boring B-6 between 4 and 6 feet bgs. Groundwater was not observed during field screening or sample collection activities.

5.0 Analytical Results

As shown in the following table, petroleum hydrocarbons identified as GRO were encountered in the soil sample at one boring location advanced at the site (B-8), at a depth from 4 to 6 feet bgs. The laboratory results indicate that the GRO concentration was detected at a concentration of 13.1 mg/kg, which is below the UST Section Action Level of 50 mg/kg GRO.

Petroleum hydrocarbons identified as DRO were encountered in the soil samples at nine boring locations advanced at the site (B-1 through B-9), at depths from 0 to 2 foot bgs (B-1 and B-7) to 6 to 7.5 feet bgs (B-5). The DRO concentrations were generally detected at concentrations below the NCDEQ Action Level of 100 mg/kg. However, DRO concentrations above the NCDEQ Action Level of 100 mg/kg were detected in sample B-1, which was collected from 0 to 2 foot bgs.

The laboratory analytical results indicate concentrations of the sum of 16 EPA PAHs above the method detection limit, but below the total NCDEQ Action Level of 9,068.816 mg/kg at Borings B-1, and B-6 through B-8. The soil analytical results are summarized in Table 1 below. The laboratory analytical results can also be found in the attached Appendix V of this report.



Table 1
Soil Sampling Analytical Results

Sample ID	Sample Date	Sample Depth (ft bgs)	PID Reading (ppm)	GRO (mg/kg)	DRO (mg/kg)	TPH (mg/kg)	Total BTEX (mg/kg)	Total Aromatics (mg/kg)	16 EPA PAHs (mg/kg)	BaP (mg/kg)
B-1	8/16/17	0-2	0.2	<93.9	2,251	2,251	<93.9	1,124	59.6	<3.8
B-2		2-4	4.3	<0.87	6.4	6.4	<0.87	3.9	<0.28	<0.035
B-3		2-4	6.3	<0.97	0.97	0.97	<0.97	0.82	<0.31	<0.039
B-4		2-4	6.0	<0.93	12	12	<0.93	6.2	<0.3	<0.037
B-5		6-7.5	3.5	<0.98	0.98	0.98	<0.98	0.55	<0.32	<0.039
B-6		2-4	5.8	<0.89	37.7	37.7	<0.89	26.1	1.3	<0.046
B-7		0-2	5.9	<0.97	28.7	28.7	<0.97	28.5	1.5	<0.058
B-8		4-6	500	13.1	34.7	47.8	<0.93	15.7	0.79	<0.037
B-9		2-4	5.0	<0.92	2.1	2.1	<0.92	1.6	<0.29	<0.037
B-10		6-7	5.9	<0.56	<0.56	<0.56	<0.56	<0.11	<0.18	<0.022
NCDEQ Action Level				50	100	NSE	13.8056	NSE	9,068.816	0.088

DRO concentrations shown in bold exceed the NCDEQ Action Level as outlined in the NCDEQ, DWM, UST Section Guidelines

ppm = parts per million

GRO = Gasoline Range Organics

DRO = Diesel Range Organics

TPH = Total Petroleum Hydrocarbons

BTEX = Benzene, Toluene, Ethylbenzene and Xylenes

NSE = No Standard Exists

6.0 Conclusions and Recommendations

F&R conducted a PSA at the Thaddeus A Furr Property addressed as 44022-C Highway 24/27 East, in Albemarle, Stanly County, North Carolina. A geophysical investigation was performed by Pyramid Environmental & Engineering to investigate the presence and location of USTs in the proposed right-of-way. Based on the results of the geophysical survey, it was determined that three metallic USTs were present just northwest of the on-site building. It should be noted that the westernmost probable UST (Probable UST #3) is located beyond of the PUE.

Ten GeoProbe borings were advanced during the assessment within the proposed right-of-way, where grading activities are proposed in association with the NC 24/27 improvements. Based on the results of laboratory testing and observed PID readings, petroleum impacted soils were encountered in the vicinity of boring location B-1, with DRO concentrations detected above the NCDEQ Action Level from 0 to 2 feet bgs. A storm water drainage pipe appears on the proposed improvement plans in this area. In addition, driveway reconstruction and curbline realignment is depicted, which will likely require re-grading of the existing ground surface during the



construction. For the purpose of this assessment, we have estimated an average petroleum-impacted area of 575.8 square feet, extending to a depth of two feet bgs. This area accounts for impacted soils that may be generated during re-grading activities and for unknown below grade utilities that may be installed during construction. The area was determined by averaging distances between the proposed right-of-way and the proposed edge of pavement on the construction drawings (Appendix I, Figure 4). F&R recommends that petroleum impacted soils and USTs removed from the project site be properly managed and disposed of in accordance with NCDEQ rules and regulations.

Table 2
Approximate Volume of Petroleum Impacted Soil

Excavation Location (As Shown on Figure 4)	L x W x D (feet)	Soil Volume (cubic feet)	Soil Volume (tons)
Area #1	L x W varies (575.8 SF) X 2' depth	1,151.6	69.1
Soil Volume (assuming a soil density of 120 pcf)		Total	69.1

It should be noted that a delineation of the soil contamination was not performed, as this was not included in the proposed scope of work. The above estimates are based on interpretations of soil analytical results, PID readings and our experience with petroleum UST releases. In order to generate estimated quantities of petroleum impacted soils, we have inferred that the contamination has occurred between the existing ground surface and the sample collection depth. The amount of impacted soil can only be determined after excavation or by advancing additional borings and performing additional laboratory analysis to delineate the extents (horizontal and vertical) of contamination.

7.0 Limitations

These services have been performed, under authorization of the North Carolina Department of Transportation for specific application on this project. These services have been performed in accordance with generally accepted environmental and hydrogeological practices. No other warranty, expressed or implied is made. As with any subsurface investigation, actual conditions exist only at the precise locations from which samples were taken. Certain inferences are based on the results of sampling and related testing to form a professional opinion of conditions in areas beyond those from which samples were taken. Our conclusions and recommendations are



based upon information provided to us by others, our sampling and testing results and our site observations. We have not verified the completeness or accuracy of the information provided by others, unless otherwise noted. Our observations are based upon conditions readily visible at the site at the time of our site visits.

Froehling & Robertson, Inc. by virtue of providing the services described in this report, does not assume the responsibility of the person(s) in charge of the site, or otherwise undertake responsibility for reporting to any local, state or federal public agencies any conditions at the site that may present a potential danger to public health, safety or the environment. In areas that require notification of local, state, or federal public agencies as required by law, it is the Client's responsibility to so notify.



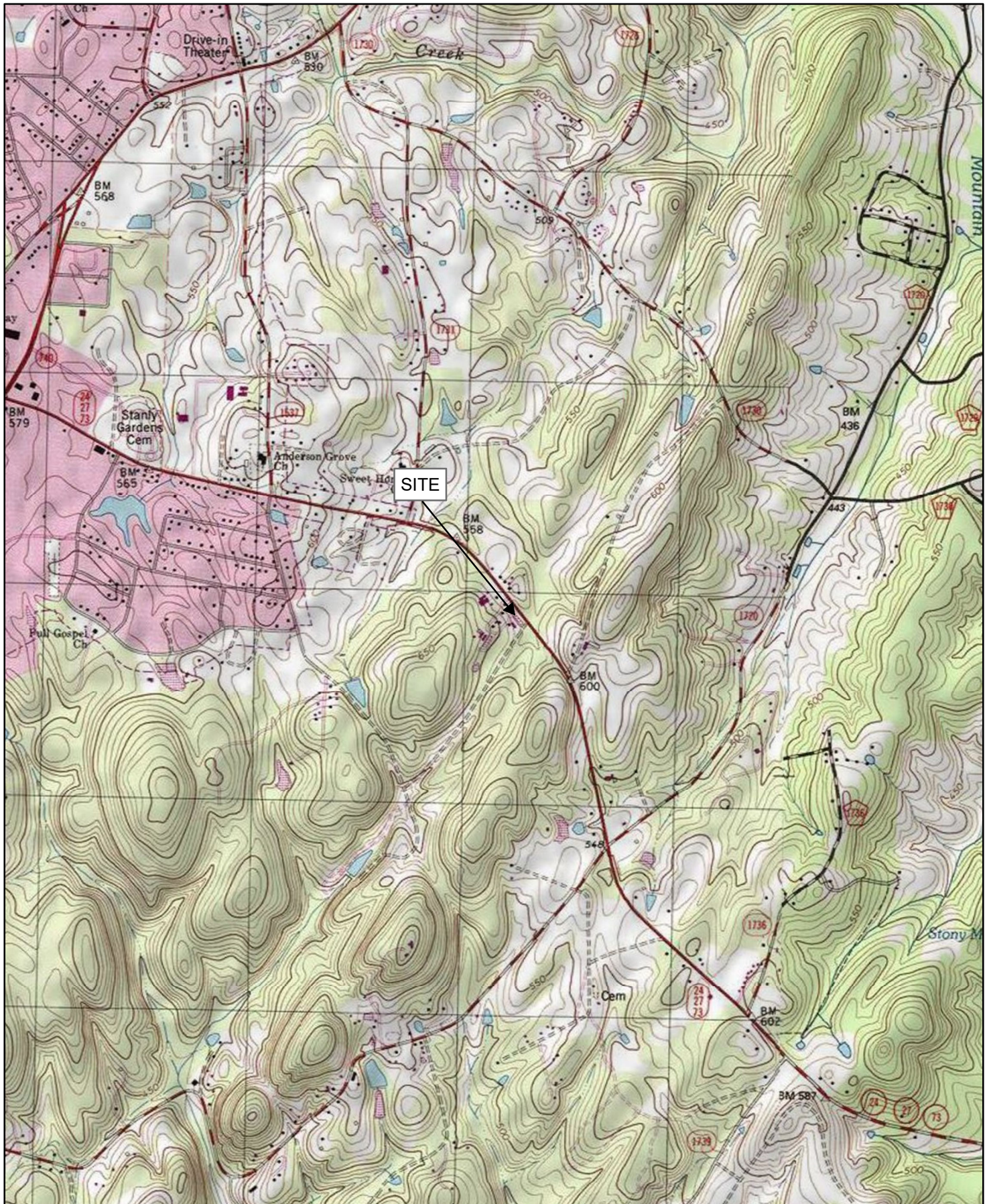
APPENDIX I

Figure No. 1 – TOPOGRAPHIC MAP

Figure No. 2 – SITE VICINITY MAP

Figure No. 3 – LABORATORY RESULTS & BORING LOCATION PLAN

Figure No. 4 – ESTIMATED EXTENTS OF SOIL CONTAMINATION



SITE TOPOGRAPHIC MAP

0 1,000 2,000 4,000 6,000 Feet



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310 Hubert Street
Raleigh, North Carolina 27603-2302 I USA
T 919.828.3441 I F 919.828.5751

Client: NCDOT

Project: R-2530B PSAs

Location: Parcel #086, Albemarle, NC

F&R Project No.: 66V-0092 44022-C Highway 24-27 East - Albemarle, North Carolina

Data: National Geographic Society 2013

Date: October 2017 (Revised Feb. 5, 2018) **Scale:** 1:24,000 1 inch = 2,000 feet

Disclaimer: F&R makes no warranties or guarantees regarding the accuracy or completeness of geographic features shown on this map. Spatial accuracy of measurement provided by source agencies can be obtained by contacting F&R.

FIGURE
No. 1



SITE VICINITY MAP

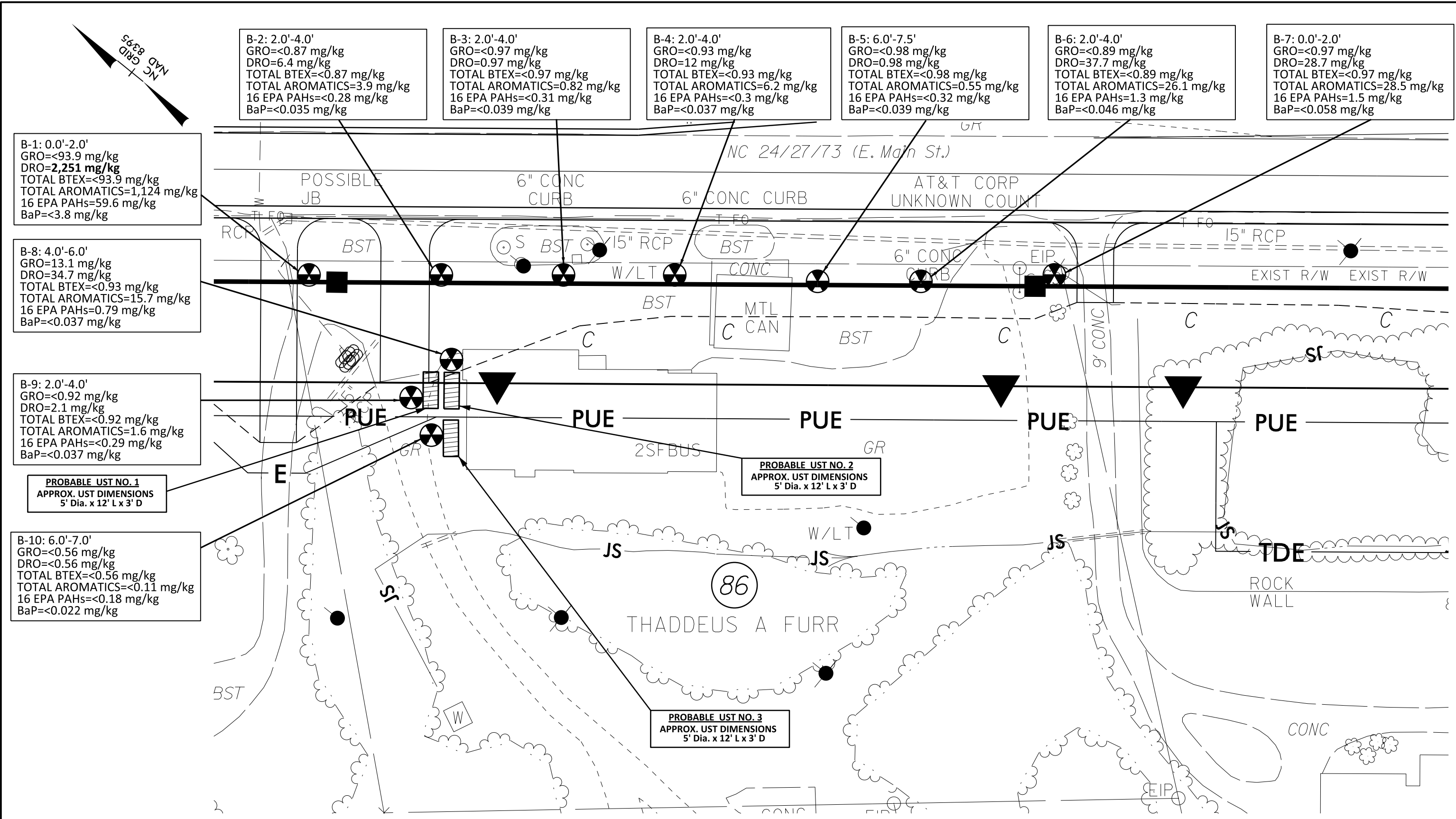
0 100 200 400 600 Feet



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Client:	NCDOT	Disclaimer: F&R makes no warranties or guarantees regarding the accuracy or completeness of geographic features shown on this map. Spatial accuracy of measurement provided by source agencies can be obtained by contacting F&R.
Project:	R-2530B PSAs	
Location:	Parcel #086, Albemarle, NC	
F&R Project No.:	66V-0092	44022-C Highway 24-27 East - Albemarle, North Carolina
Data:	ArcMap Imagery	
Date:	October 2017 (Revised Feb. 5, 2018)	Scale: 1:2,400 1 inch = 200 feet

FIGURE
No.: 2



B-1: 0.0'-2.0'
GRO=<93.9 mg/kg
DRO=**2,251 mg/kg**
TOTAL BTEX=<93.9 mg/kg
TOTAL AROMATICS=1,124 mg/kg
16 EPA PAHs=59.6 mg/kg
BaP=<3.8 mg/kg

B-8: 4.0'-6.0'
GRO=13.1 mg/kg
DRO=34.7 mg/kg
TOTAL BTEX=<0.93 mg/kg
TOTAL AROMATICS=15.7 mg/kg
16 EPA PAHs=0.79 mg/kg
BaP=<0.037 mg/kg

B-9: 2.0'-4.0'
GRO=<0.92 mg/kg
DRO=2.1 mg/kg
TOTAL BTEX=<0.92 mg/kg
TOTAL AROMATICS=1.6 mg/kg
16 EPA PAHs=<0.29 mg/kg
BaP=<0.037 mg/kg

PROBABLE UST NO. 1
APPROX. UST DIMENSIONS
5' Dia. x 12' L x 3' D

B-10: 6.0'-7.0'
GRO=<0.56 mg/kg
DRO=<0.56 mg/kg
TOTAL BTEX=<0.56 mg/kg
TOTAL AROMATICS=<0.11 mg/kg
16 EPA PAHs=<0.18 mg/kg
BaP=<0.022 mg/kg

B-2: 2.0'-4.0'
GRO=<0.87 mg/kg
DRO=6.4 mg/kg
TOTAL BTEX=<0.87 mg/kg
TOTAL AROMATICS=3.9 mg/kg
16 EPA PAHs=<0.28 mg/kg
BaP=<0.035 mg/kg

B-3: 2.0'-4.0'
GRO=<0.97 mg/kg
DRO=0.97 mg/kg
TOTAL BTEX=<0.97 mg/kg
TOTAL AROMATICS=0.82 mg/kg
16 EPA PAHs=<0.31 mg/kg
BaP=<0.039 mg/kg

B-4: 2.0'-4.0'
GRO=<0.93 mg/kg
DRO=12 mg/kg
TOTAL BTEX=<0.93 mg/kg
TOTAL AROMATICS=6.2 mg/kg
16 EPA PAHs=<0.3 mg/kg
BaP=<0.037 mg/kg

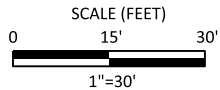
B-5: 6.0'-7.5'
GRO=<0.98 mg/kg
DRO=0.98 mg/kg
TOTAL BTEX=<0.98 mg/kg
TOTAL AROMATICS=0.55 mg/kg
16 EPA PAHs=<0.32 mg/kg
BaP=<0.039 mg/kg

B-6: 2.0'-4.0'
GRO=<0.89 mg/kg
DRO=37.7 mg/kg
TOTAL BTEX=<0.89 mg/kg
TOTAL AROMATICS=26.1 mg/kg
16 EPA PAHs=1.3 mg/kg
BaP=<0.046 mg/kg

B-7: 0.0'-2.0'
GRO=<0.97 mg/kg
DRO=28.7 mg/kg
TOTAL BTEX=<0.97 mg/kg
TOTAL AROMATICS=28.5 mg/kg
16 EPA PAHs=1.5 mg/kg
BaP=<0.058 mg/kg

PROBABLE UST NO. 2
APPROX. UST DIMENSIONS
5' Dia. x 12' L x 3' D


PROBABLE UST NO. 3
APPROX. UST DIMENSIONS
5' Dia. x 12' L x 3' D



SINCE

1881

FROEHLING & ROBERTSON, INC.
Engineering Stability Since 1881
310 Hubert Street
Raleigh, North Carolina 27603-2302 | USA
T 919.828.3441 | F 919.828.5751
www.fandr.com

LEGEND		LABORATORY RESULTS & BORING LOCATION PLAN	
 Approximate Geoprobe Boring Location		CLIENT: NCDOT	
Sample data shown in bold exceed the NCDEQ Action Level as outlined in the NCDEQ DWM UST Section Guidance		PROJECT: R-2530B PSAs	
		LOCATION: Albemarle, NC Parcel #086, 44022-C Highway 24/27 East	
		F&R PROJECT No.: 66V-0092	
		DRAWN BY: T. T. Walker	CHECKED BY: B. Whitley, P.E.
		DATE: February 2018	SCALE: 1"=30'
		FIGURE No.: 3	

Estimated Extents of Soil Contamination

L x W varies (575.8 SF)
x 2' depth= 69.1 tons

B-1: 0.0'-2.0'
GRO=<93.9 mg/kg
DRO=**2,251 mg/kg**
TOTAL BTEX=<93.9 mg/kg
TOTAL AROMATICS=1,124 mg/kg
16 EPA PAHs=59.6 mg/kg
BaP=<3.8 mg/kg

B-8: 4.0'-6.0'
GRO=13.1 mg/kg
DRO=34.7 mg/kg
TOTAL BTEX=<0.93 mg/kg
TOTAL AROMATICS=15.7 mg/kg
16 EPA PAHs=0.79 mg/kg
BaP=<0.037 mg/kg

B-9: 2.0'-4.0'
GRO=<0.92 mg/kg
DRO=2.1 mg/kg
TOTAL BTEX=<0.92 mg/kg
TOTAL AROMATICS=1.6 mg/kg
16 EPA PAHs=<0.29 mg/kg
BaP=<0.037 mg/kg

PROBABLE UST NO. 1
APPROX. UST DIMENSIONS
5' Dia. x 12' L x 3' D

B-10: 6.0'-7.0'
GRO=<0.56 mg/kg
DRO=<0.56 mg/kg
TOTAL BTEX=<0.56 mg/kg
TOTAL AROMATICS=<0.11 mg/kg
16 EPA PAHs=<0.18 mg/kg
BaP=<0.022 mg/kg

B-2: 2.0'-4.0'
GRO=<0.87 mg/kg
DRO=6.4 mg/kg
TOTAL BTEX=<0.87 mg/kg
TOTAL AROMATICS=3.9 mg/kg
16 EPA PAHs=<0.28 mg/kg
BaP=<0.035 mg/kg

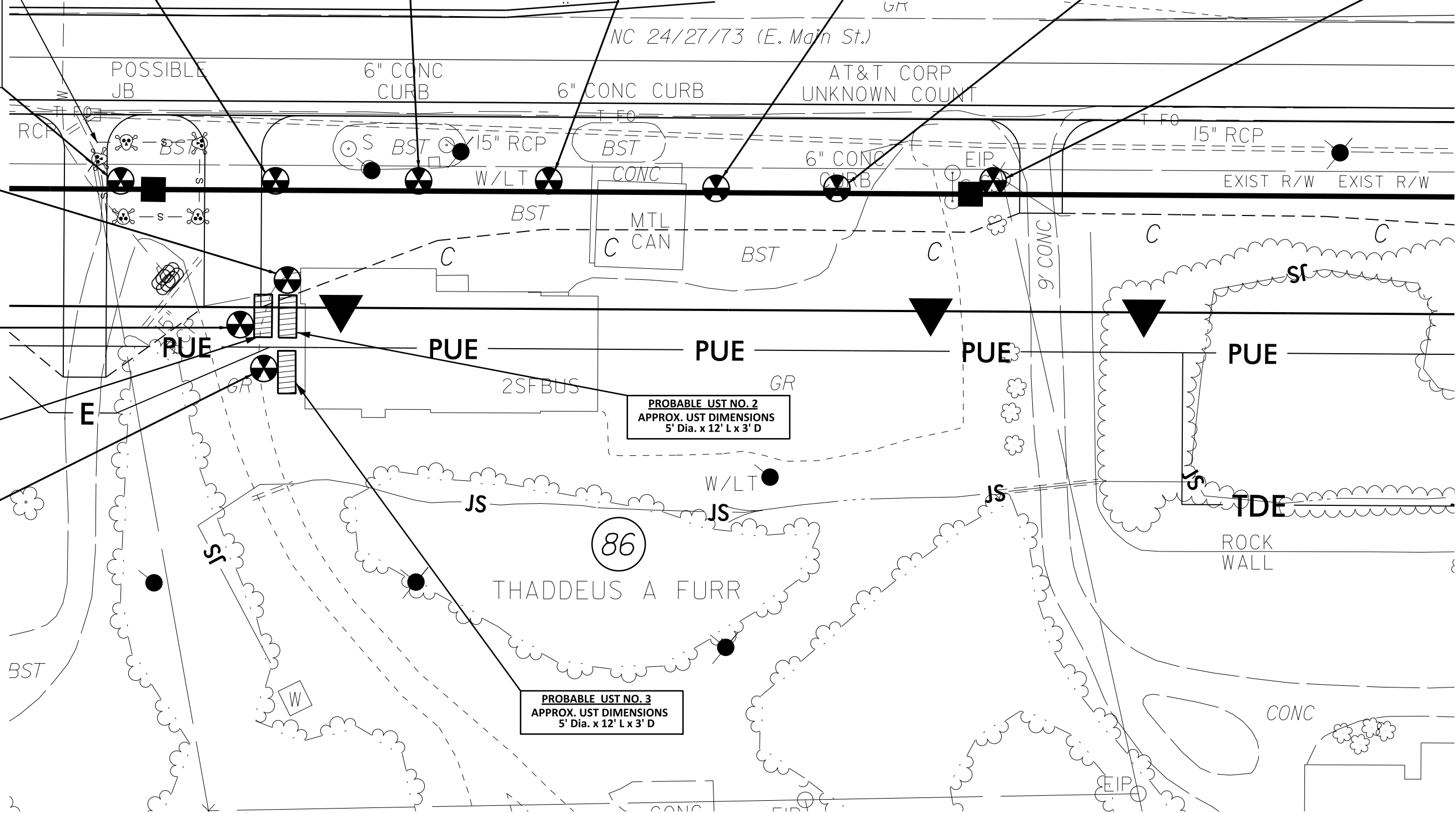
B-3: 2.0'-4.0'
GRO=<0.97 mg/kg
DRO=0.97 mg/kg
TOTAL BTEX=<0.97 mg/kg
TOTAL AROMATICS=0.82 mg/kg
16 EPA PAHs=<0.31 mg/kg
BaP=<0.039 mg/kg

B-4: 2.0'-4.0'
GRO=<0.93 mg/kg
DRO=12 mg/kg
TOTAL BTEX=<0.93 mg/kg
TOTAL AROMATICS=6.2 mg/kg
16 EPA PAHs=<0.3 mg/kg
BaP=<0.037 mg/kg

B-5: 6.0'-7.5'
GRO=<0.98 mg/kg
DRO=0.98 mg/kg
TOTAL BTEX=<0.98 mg/kg
TOTAL AROMATICS=0.55 mg/kg
16 EPA PAHs=<0.32 mg/kg
BaP=<0.039 mg/kg

B-6: 2.0'-4.0'
GRO=<0.89 mg/kg
DRO=37.7 mg/kg
TOTAL BTEX=<0.89 mg/kg
TOTAL AROMATICS=26.1 mg/kg
16 EPA PAHs=1.3 mg/kg
BaP=<0.046 mg/kg

B-7: 0.0'-2.0'
GRO=<0.97 mg/kg
DRO=28.7 mg/kg
TOTAL BTEX=<0.97 mg/kg
TOTAL AROMATICS=28.5 mg/kg
16 EPA PAHs=1.5 mg/kg
BaP=<0.058 mg/kg



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LEGEND

Approximate Geoprobe Boring Location

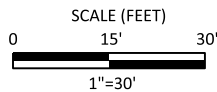
Sample data shown in bold exceed the NCDEQ Action Level as outlined in the NCDEQ DWM UST Section Guidance

ESTIMATED EXTENTS OF SOIL CONTAMINATION

CLIENT: NCDOT
PROJECT: R-2530B PSAs
LOCATION: Albemarle, NC Parcel #086, 44022-C Highway 24/27 East
F&R PROJECT No.: 66V-0092

DRAWN BY: T. T. Walker	CHECKED BY: B. Whitley, P.E.
DATE: February 2018	SCALE: 1"=30'

FIGURE No.: **4**





APPENDIX II

GEOPHYSICAL REPORT PREPARED BY PYRAMID



PYRAMID GEOPHYSICAL SERVICES
(PROJECT 2017-203)

GEOPHYSICAL SURVEY

METALLIC UST INVESTIGATION: PARCEL 086 NCDOT PROJECT R-2530B

44022-C HIGHWAY 24/27 EAST, ALBEMARLE, NC

SEPTEMBER 8, 2017

Report prepared for:

Benjamin Whitley, P.E.
Froehling and Robertson
310 Hubert Street
Raleigh, North Carolina 27603

Prepared by:

A handwritten signature in black ink, appearing to read "E. Cross", written over a horizontal line.

Eric C. Cross, P.G.
NC License #2181

Reviewed by:

A handwritten signature in black ink, appearing to read "Doug Canavella", written over a horizontal line.

Douglas A. Canavella, P.G.
NC License #1066

503 INDUSTRIAL AVENUE, GREENSBORO, NC 27406

P: 336.335.3174 F: 336.691.0648

C257: GEOLOGY

C1251: ENGINEERING

GEOPHYSICAL INVESTIGATION REPORT
Parcel 086 – 44022-C Highway 24/27 East
Albemarle, Stanly County, North Carolina

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LIST OF ACRONYMS

CADD	Computer Assisted Drafting and Design
DF	Dual Frequency
EM.....	Electromagnetic
GPR.....	Ground Penetrating Radar
GPS	Global Positioning System
NCDOT.....	North Carolina Department of Transportation
ROW	Right-of-Way
UST	Underground Storage Tank

EXECUTIVE SUMMARY

Project Description: Pyramid Environmental conducted a geophysical investigation for Froehling and Robertson, Inc. (F&R) at Parcel 086, located at 44022-C Highway 24/27 East, Albemarle, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-2530B). F&R directed Pyramid as to the geophysical survey boundaries at the project site, which were designed to extend from the existing edge of pavement to the proposed ROW lines and/or easement lines within the property, whichever distance was greater. Conducted from July 25-26, 2017, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

Geophysical Results: The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. A total of six EM anomalies were identified. One large EM feature on the northwest side of the building was associated with unknown buried metal, and was investigated further by GPR. Additionally, an EM feature on the south side of the building and a zone suspected to contain reinforced concrete were investigated by GPR.

GPR provided evidence of three isolated hyperbolic reflectors and three discrete lateral reflectors on the northwest side of the building that are characteristic of USTs. The combined geophysical data resulted in these features being classified as three probable metallic USTs (center points: north tank – 1660205.59, 580870.54, northeast tank – 1660209.76, 580865.22, west tank – 1660197.03, 580855.31 North Carolina State Plane NAD83, feet). The three probable metallic USTs were all approximately 12 feet long and 5 feet wide at depths of approximately 2-3 feet below the ground surface. It should be noted that the westernmost probable UST was outside of the EM geophysical survey area, but was identified during the GPR survey across this location. This probable UST is observed to lie directly on the NCDOT easement, with the majority or all of the actual tank located outside of the easement.

GPR also verified the presence of reinforced concrete and possible buried debris or utilities.

Collectively, the geophysical data recorded evidence of three probable metallic USTs at Parcel 086.

INTRODUCTION

Pyramid Environmental conducted a geophysical investigation for Froehling and Robertson, Inc. (F&R) at Parcel 086, located at 44022-C Highway 24/27 East, Albemarle, NC. The survey was part of a North Carolina Department of Transportation (NCDOT) Right-of-Way (ROW) investigation (NCDOT Project R-2530B). F&R directed Pyramid as to the geophysical survey boundaries at the project site, which were designed to extend from the existing edge of pavement to the proposed ROW lines and/or easement lines within the property, whichever distance was greater. Conducted from July 25-26, 2017, the geophysical investigation was performed to determine if unknown, metallic underground storage tanks (USTs) were present beneath the survey area.

The site included a commercial building and canopy surrounded by a gravel parking area and grass medians. An aerial photograph showing the survey area boundaries and ground-level photographs are shown in **Figure 1**.

FIELD METHODOLOGY

The geophysical investigation consisted of electromagnetic (EM) induction-metal detection and ground penetrating radar (GPR) surveys. Pyramid collected the EM data using a Geonics EM61 metal detector integrated with a Trimble AG-114 GPS antenna. The integrated GPS system allows the location of the instrument to be recorded in real-time during data collection, resulting in an EM data set that is geo-referenced and can be overlain on aerial photographs and CADD drawings. A boundary grid was established around the perimeter of the site with marks every 10 feet to maintain orientation of the instrument throughout the survey and assure complete coverage of the area.

According to the instrument specifications, the EM61 can detect a metal drum down to a maximum depth of approximately 8 feet. Smaller objects (1-foot or less in size) can be detected to a maximum depth of 4 to 5 feet. The EM61 data were digitally collected at approximately 0.8-foot intervals along north-south trending or east-west trending,

generally parallel survey lines, spaced five feet apart. The data were downloaded to a computer and reviewed in the field and office using the Geonics NAV61 and Surfer for Windows Version 14.0 software programs.

GPR data were acquired across select EM anomalies on July 26, 2017, using a Geophysical Survey Systems, Inc. (GSSI) UtilityScan DF unit equipped with a dual frequency 300/800 MHz antenna. Data were collected both in reconnaissance fashion as well as along formal transect lines across EM features. The GPR data were viewed in real-time using a vertical scan of 512 samples, at a rate of 48 scans per second. GPR data were viewed down to a maximum depth of approximately 6 feet, based on dielectric constants calculated by the DF unit in the field during the reconnaissance scans. GPR transects across specific anomalies were saved to the hard drive of the DF unit for post-processing and figure generation.

Pyramid's classifications of USTs for the purposes of this report are based directly on the geophysical UST ratings provided by the NCDOT. These ratings are as follows:

Geophysical Surveys for Underground Storage Tanks on NCDOT Projects			
High Confidence	Intermediate Confidence	Low Confidence	No Confidence
Known UST Active tank - spatial location, orientation, and approximate depth determined by geophysics.	Probable UST Sufficient geophysical data from both magnetic and radar surveys that is characteristic of a tank. Interpretation may be supported by physical evidence such as fill/vent pipe, metal cover plate, asphalt/concrete patch, etc.	Possible UST Sufficient geophysical data from either magnetic or radar surveys that is characteristic of a tank. Additional data is not sufficient enough to confirm or deny the presence of a UST.	Anomaly noted but not characteristic of a UST. Should be noted in the text and may be called out in the figures at the geophysicist's discretion.

DISCUSSION OF RESULTS

Discussion of EM Results

A contour plot of the EM61 results obtained across the survey area at the property is presented in **Figure 2**. Each EM anomaly is numbered for reference in the figure. The

following table presents the list of EM anomalies and the cause of the metallic response, if known:

LIST OF METALLIC ANOMALIES IDENTIFIED BY EM SURVEY

Metallic Anomaly #	Cause of Anomaly	Investigated with GPR
1	Three probable USTs	☑
2	Reinforced concrete	☑
3	Mailbox	
4	Canopy	
5	Debris or utility	☑
6	Sign	

Several of the EM anomalies were directly attributed to visible cultural features including a mailbox, the canopy, a sign, and an area suspected to contain reinforced concrete (Anomaly 2). However, one large high-amplitude EM feature was observed on the northwest side of the building (Anomaly 1) that was associated with unknown buried metal. This feature was investigated further by GPR. Additionally, Anomaly 5 on the south side of the building was associated with unknown buried metal, and was investigated with GPR. Lastly, the area suspected to contain reinforced concrete (Anomaly 2) was investigated by GPR.

Discussion of GPR Results

Figure 3 presents the locations of the formal GPR transects performed at the property, as well as select transect images. All of the GPR transect images are presented in **Appendix A**. A total of twelve GPR transects were performed at the site. GPR Transects 1-5 were performed across Anomaly 2 on the east side of the building, and verified that this EM feature was the result of metal-reinforced concrete. No evidence of any structures underlying the reinforcement was observed.

GPR Transects 6-10 were performed across Anomaly 1 on the northwest side of the building. These transects showed three isolated hyperbolic reflectors and three discreet lateral reflectors that are characteristic of metal USTs. The combined EM and GPR data

result in these features being classified as three probable USTs (center points: north tank – 1660205.59, 580870.54, northeast tank – 1660209.76, 580865.22, west tank – 1660197.03, 580855.31 North Carolina State Plane NAD83, feet). All three probable USTs were approximately 12 feet long and 5 feet wide at depths of approximately 2-3 feet below the ground surface. **Figure 4** presents the location of the probable USTs on an aerial photograph along with a ground-level photograph.

GPR Transects 11 and 12 were performed across Anomaly 5, and recorded minor disrupted reflectors and hyperbolic features that suggested possible buried metallic debris or portions of utilities. No evidence of additional USTs was observed at this location.

Collectively, the geophysical data recorded evidence of three probable metallic USTs at Parcel 086.

Figure 5 provides the locations of the probable USTs and an overlay of the geophysical survey area onto the NCDOT MicroStation engineering plans (proposed ROW and easements) for reference. It should be noted that the westernmost probable UST was outside of the EM geophysical survey area, but was identified during the GPR survey across this location. This probable UST is observed to lie directly on the NCDOT easement, with the majority or all of the actual tank located outside of the easement. As the GPS positions are not survey grade, this UST may be located slightly within the NCDOT easement.

SUMMARY & CONCLUSIONS

Pyramid's evaluation of the EM61 and GPR data collected at Parcel 086 in Albemarle, North Carolina, provides the following summary and conclusions:

- The EM61 and GPR surveys provided reliable results for the detection of metallic USTs within the accessible portions of the geophysical survey area.
- One large EM feature on the northwest side of the building was associated with unknown buried metal, and was investigated further by GPR. Additionally, an EM

feature on the south side of the building and a zone suspected to contain reinforced concrete were investigated by GPR.

- GPR provided evidence of three isolated hyperbolic reflectors and three discrete lateral reflectors that are characteristic of USTs on the northwest side of the building. The combined geophysical data resulted in these features being classified as three probable metallic USTs (center points: north tank – 1660205.59, 580870.54, northeast tank – 1660209.76, 580865.22, west tank – 1660197.03, 580855.31 North Carolina State Plane NAD83, feet).
- The three probable metallic USTs were all approximately 12 feet long and 5 feet wide at depths of approximately 2-3 feet below the ground surface.
- It should be noted that the westernmost probable UST was outside of the EM geophysical survey area, but was identified during the GPR survey across this location. This probable UST is observed to lie directly on the NCDOT easement, with the majority or all of the actual tank located outside of the easement.
- GPR also verified the presence of reinforced concrete and possible buried debris or utilities.
- Collectively, the geophysical data recorded evidence of three probable metallic USTs at Parcel 086.

LIMITATIONS

Geophysical surveys have been performed and this report was prepared for F&R in accordance with generally accepted guidelines for EM61 and GPR surveys. It is generally recognized that the results of the EM61 and GPR surveys are non-unique and may not represent actual subsurface conditions. The EM61 and GPR results obtained for this project have not conclusively determined the definitive presence or absence of metallic USTs, but the evidence collected is sufficient to result in the conclusions made in this report. Additionally, it should be understood that areas containing extensive vegetation, reinforced concrete, or other restrictions to the accessibility of the geophysical instruments could not be fully investigated.




APPROXIMATE BOUNDARIES OF GEOPHYSICAL SURVEY AREA



View of Survey Area
(Facing Approximately Southeast)

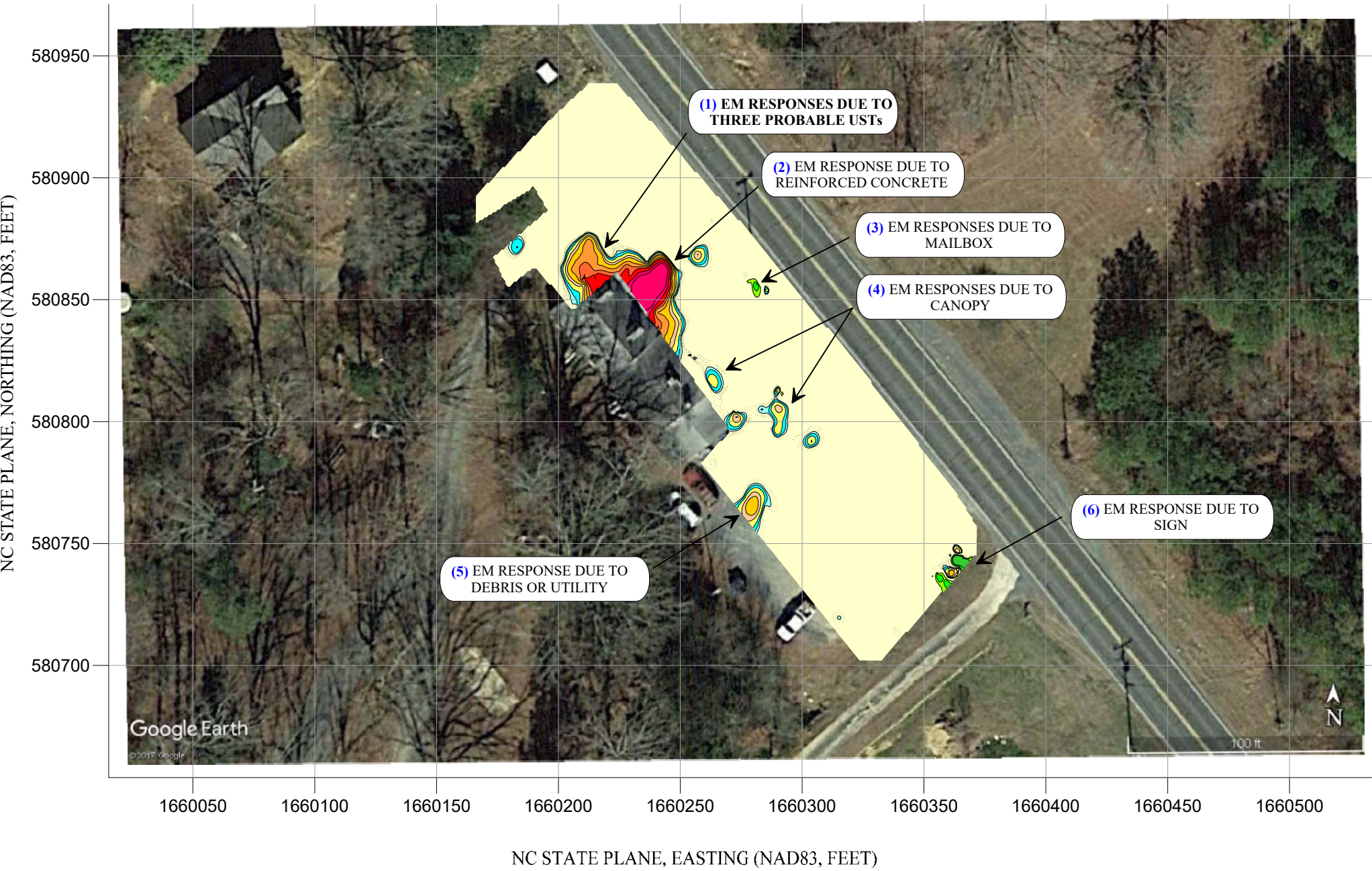


View of Survey Area
(Facing Approximately Southeast)

TITLE PARCEL 086 - GEOPHYSICAL SURVEY BOUNDARIES AND SITE PHOTOGRAPHS		
PROJECT PARCEL 086 ALBEMARLE, NORTH CAROLINA NCDOT PROJECT R-2530B		
<div><div>503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology</div></div>		
DATE	8/24/2017	CLIENT FROEHLING & ROBERTSON
PYRAMID PROJECT #:	2017-203	FIGURE 1



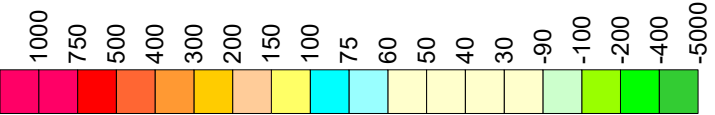
EM61 METAL DETECTION RESULTS




EVIDENCE OF THREE PROBABLE METALLIC USTs OBSERVED.

The contour plot shows the differential results of the EM61 instrument in millivolts (mV). The differential results focus on larger metallic objects such as USTs and drums. The EM61 data were collected on July 25, 2017, using a Geonics EM61 instrument. Verification GPR data were collected on July 26, 2017, using a GSSI UtilityScan DF unit with a dual frequency 300/800 MHz antenna.

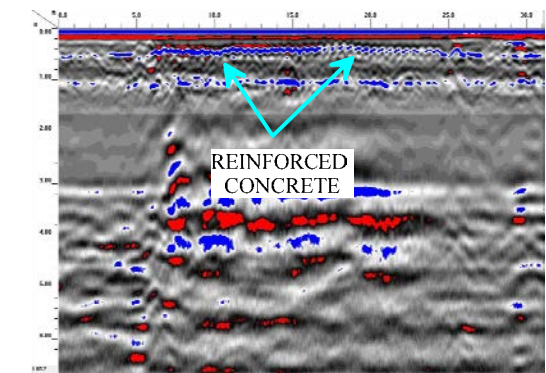
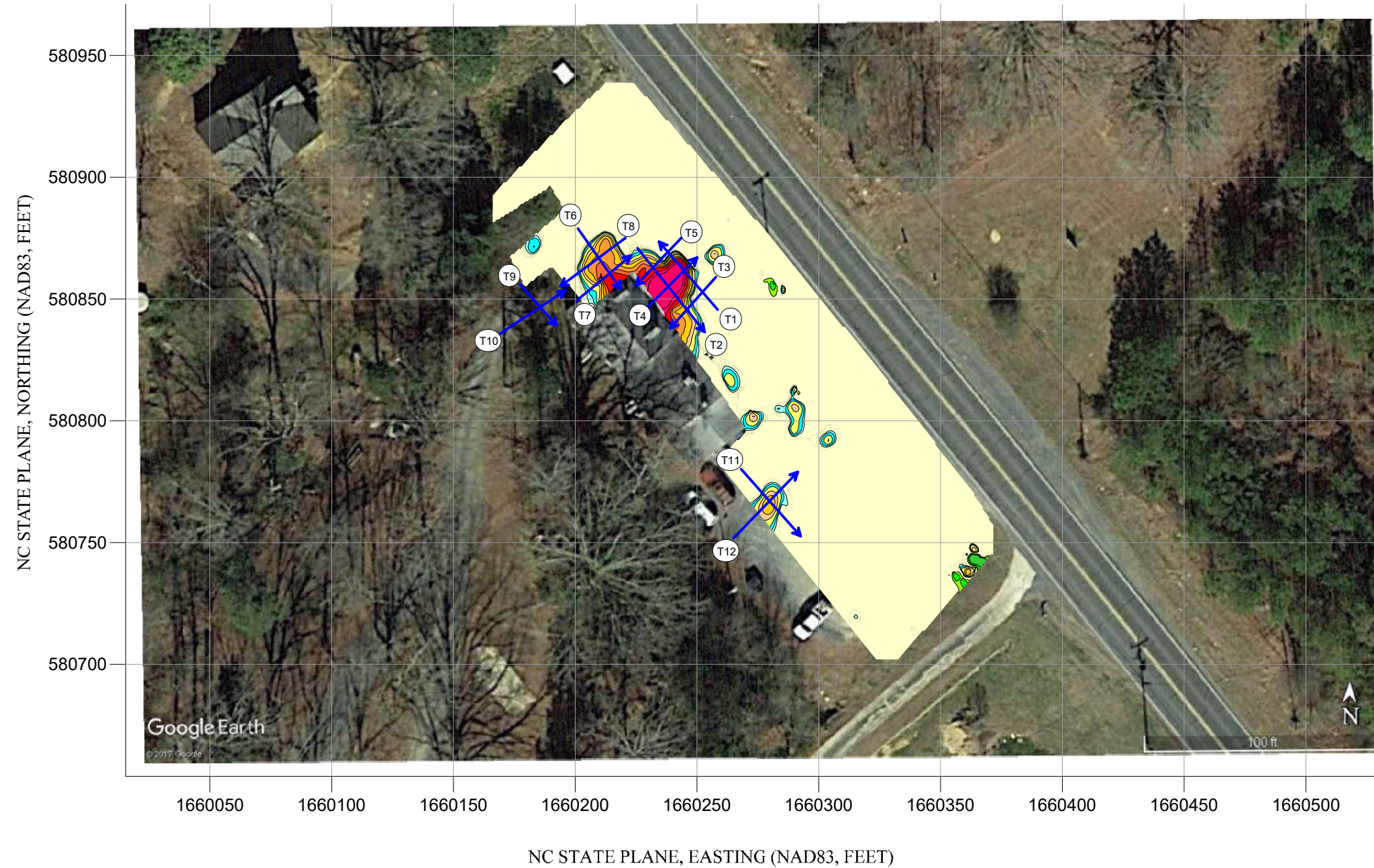
EM61 Metal Detection Response (millivolts)



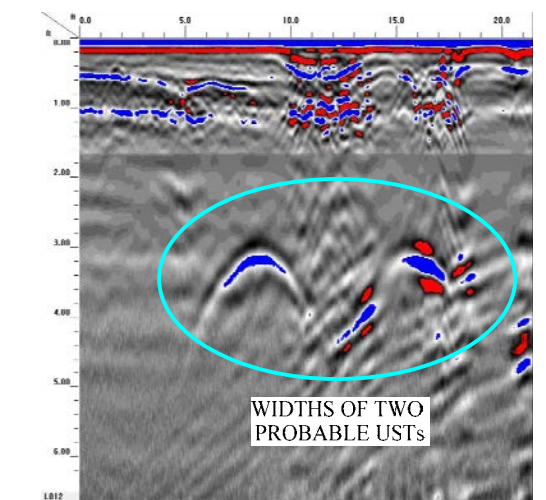
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PROJECT		PARCEL 086 ALBEMARLE, NORTH CAROLINA NCDOT PROJECT R-2530B	
		503 INDUSTRIAL AVENUE GREENSBORO, NC 27460 (336) 335-3174 (p) (336) 691-0648 (f) License # C1251 Eng. / License # C257 Geology	
DATE	8/24/2017	CLIENT FROEHLING & ROBERTSON	
PYRAMID PROJECT #:	2017-203	FIGURE 2	

N ↑

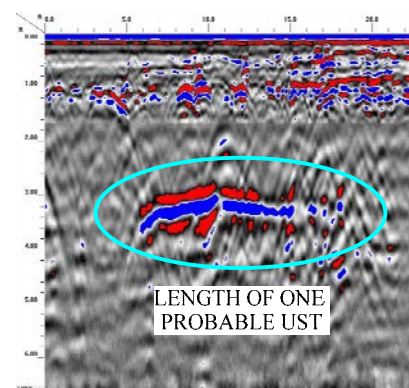
GPR TRANSECT LOCATIONS



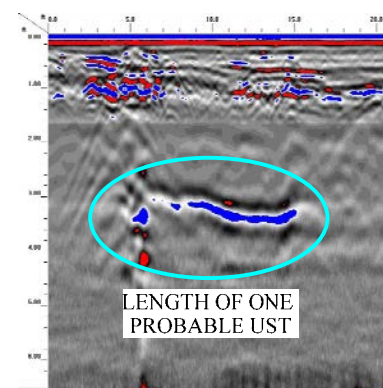
GPR TRANSECT 1 (T1)



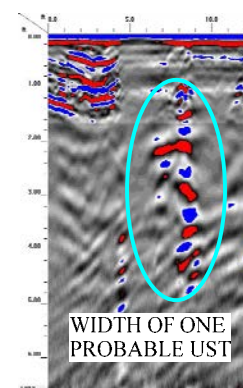
GPR TRANSECT 6 (T6)



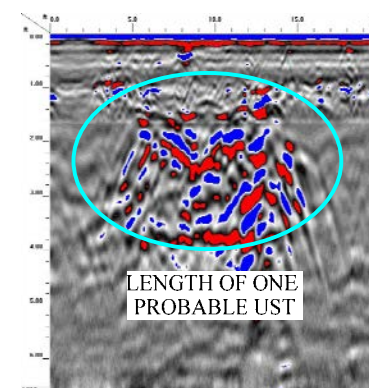
GPR TRANSECT 7 (T7)



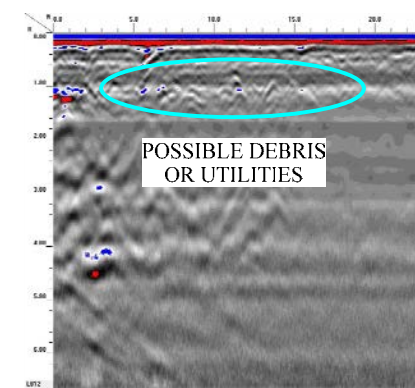
GPR TRANSECT 8 (T8)




GPR TRANSECT 9 (T9)



GPR TRANSECT 10 (T10)



GPR TRANSECT 11 (T11)


TITLE		PARCEL 086 - GPR TRANSECT LOCATIONS AND SELECT IMAGES	
PROJECT		PARCEL 086 ALBEMARLE, NORTH CAROLINA NCDOT PROJECT R-2530B	
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DATE	8/24/2017	CLIENT	FROEHLING & ROBERTSON
PYRAMID PROJECT #:	2017-203	FIGURE 3	

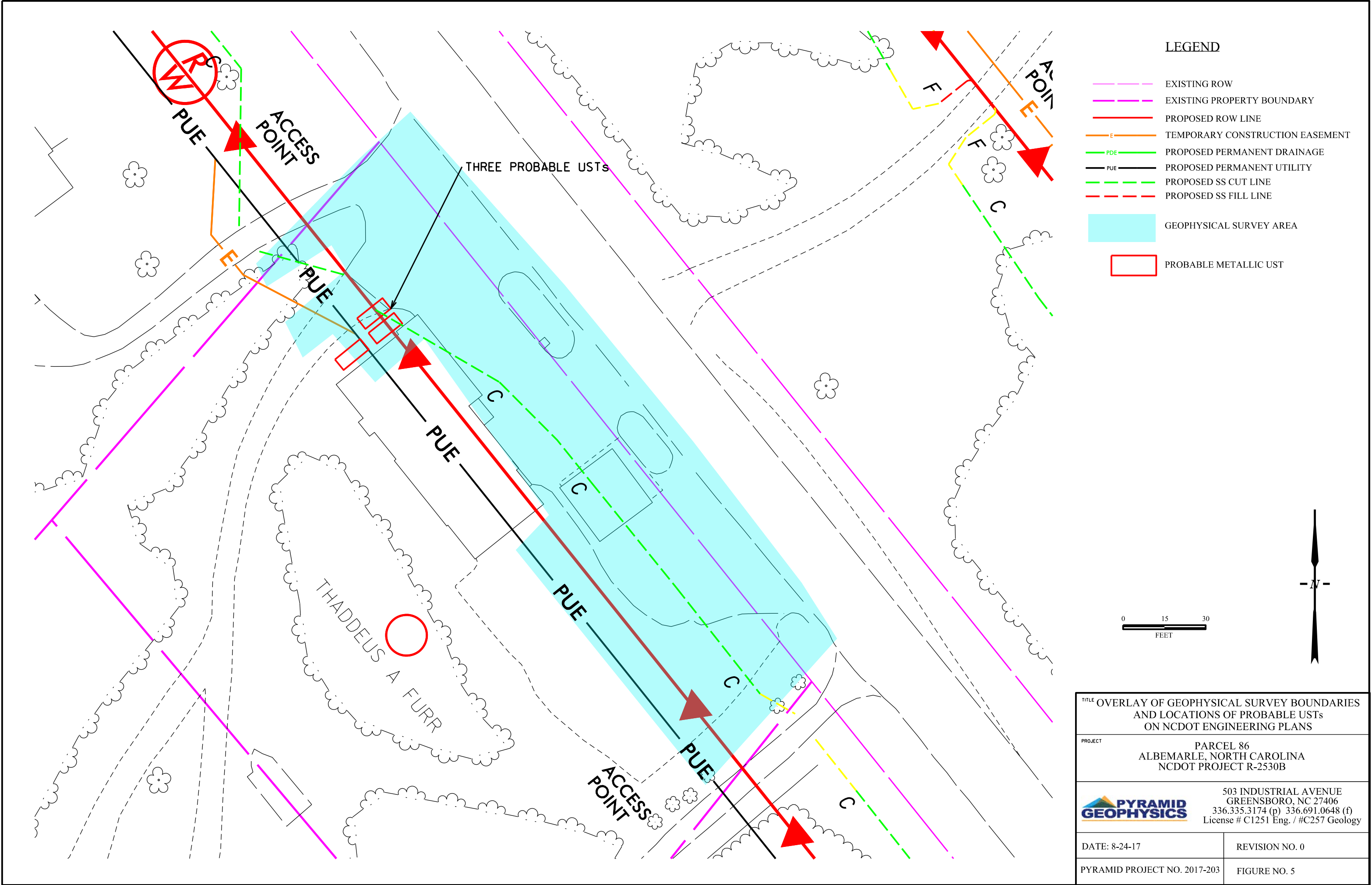
N↑

LOCATIONS OF PROBABLE METALLIC USTs



View of Three Probable USTs
Facing Approximately West

TITLE		PARCEL 086 - LOCATIONS AND SIZES OF PROBABLE USTs	
PROJECT		PARCEL 086 ALBEMARLE, NORTH CAROLINA NCDOT PROJECT R-2530B	
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DATE	8/3/2017	CLIENT FROEHLING & ROBERTSON	
PYRAMID PROJECT #:	2017-203	FIGURE 4	

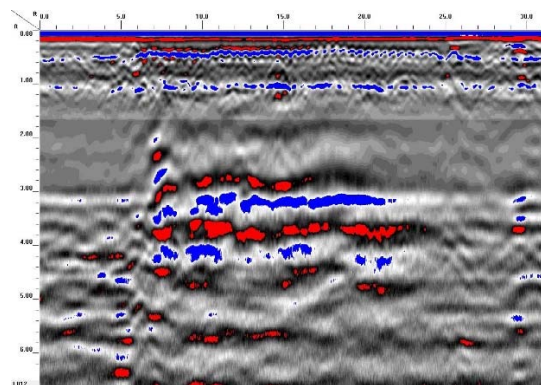


LEGEND

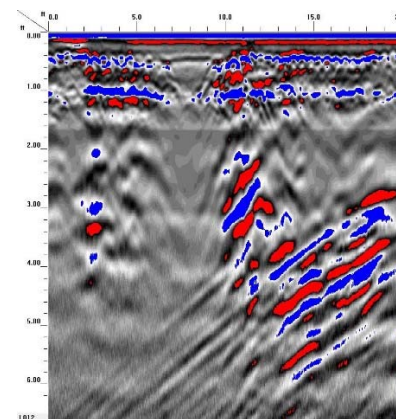
- EXISTING ROW
- EXISTING PROPERTY BOUNDARY
- PROPOSED ROW LINE
- TEMPORARY CONSTRUCTION EASEMENT
- PROPOSED PERMANENT DRAINAGE
- PROPOSED PERMANENT UTILITY
- PROPOSED SS CUT LINE
- PROPOSED SS FILL LINE
- GEOPHYSICAL SURVEY AREA
- PROBABLE METALLIC UST

TITLE OVERLAY OF GEOPHYSICAL SURVEY BOUNDARIES AND LOCATIONS OF PROBABLE USTs ON NCDOT ENGINEERING PLANS	
PROJECT PARCEL 86 ALBEMARLE, NORTH CAROLINA NCDOT PROJECT R-2530B	
503 INDUSTRIAL AVENUE GREENSBORO, NC 27406 336.335.3174 (p) 336.691.0648 (f) License # C1251 Eng. / #C257 Geology	
DATE: 8-24-17	REVISION NO. 0
PYRAMID PROJECT NO. 2017-203	FIGURE NO. 5

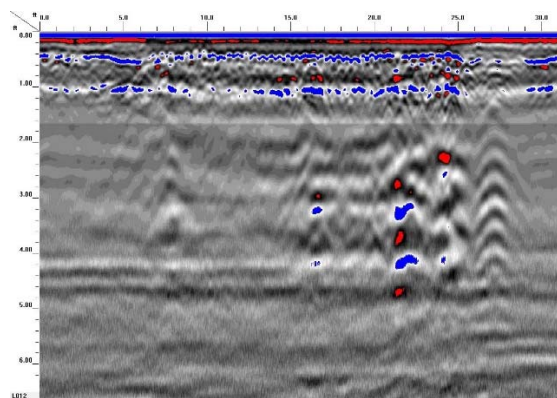
Appendix A – GPR Transect Images



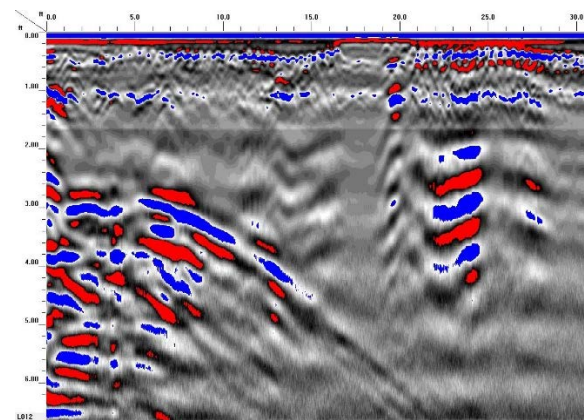
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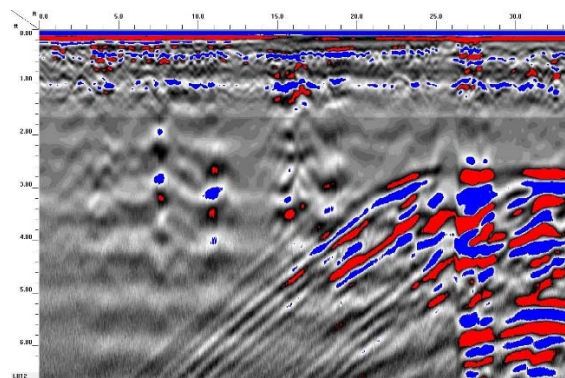
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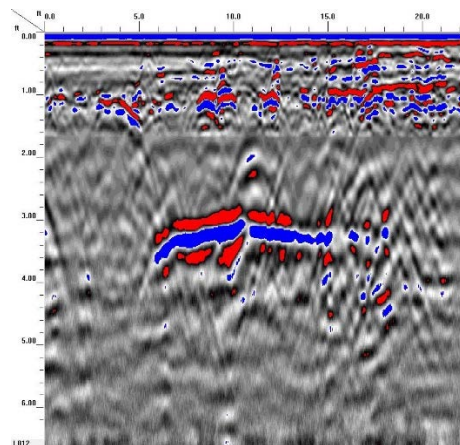
GPR TRANSECT 2



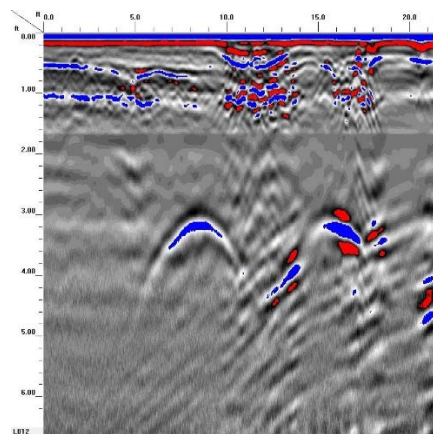
GPR TRANSECT 4



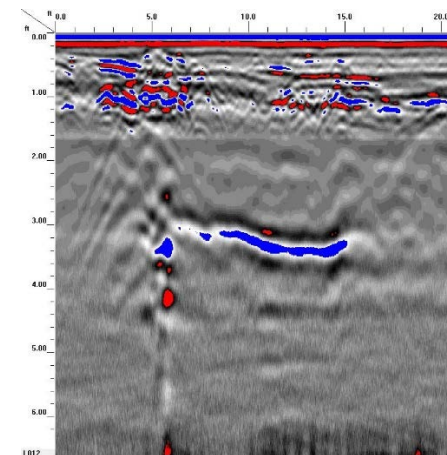
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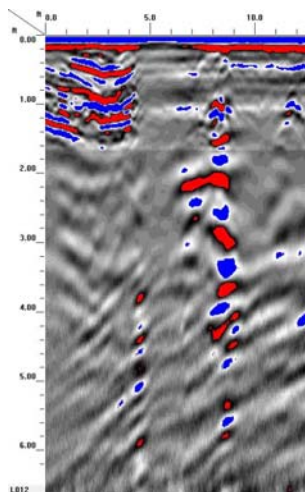
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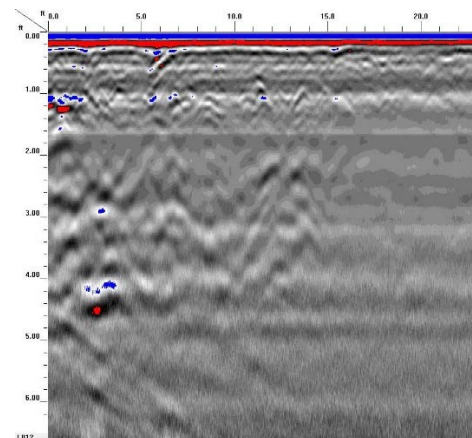
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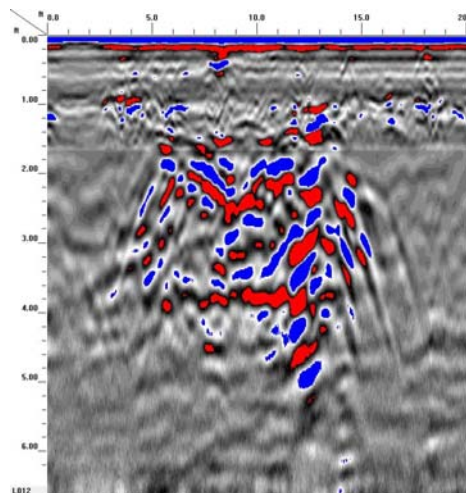
GPR TRANSECT 8



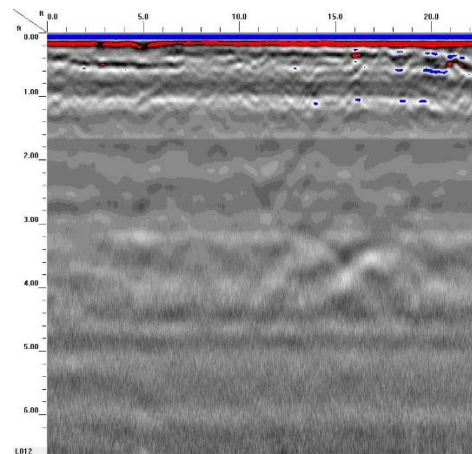
GPR TRANSECT 9



GPR TRANSECT 11



GPR TRANSECT 10



GPR TRANSECT 12



APPENDIX III

SITE PHOTOS



Photo #1: Boring locations B-1 and B-2, facing southeast.



Photo #2: Boring locations B-2 and B-3, facing northwest.



Photo #3: Boring locations B-4 and B-5, facing southeast.



Photo #4: Boring locations B-6 and B-7, facing northwest.



Photo #5: Boring locations B-8, B-9, and B-10, facing south.

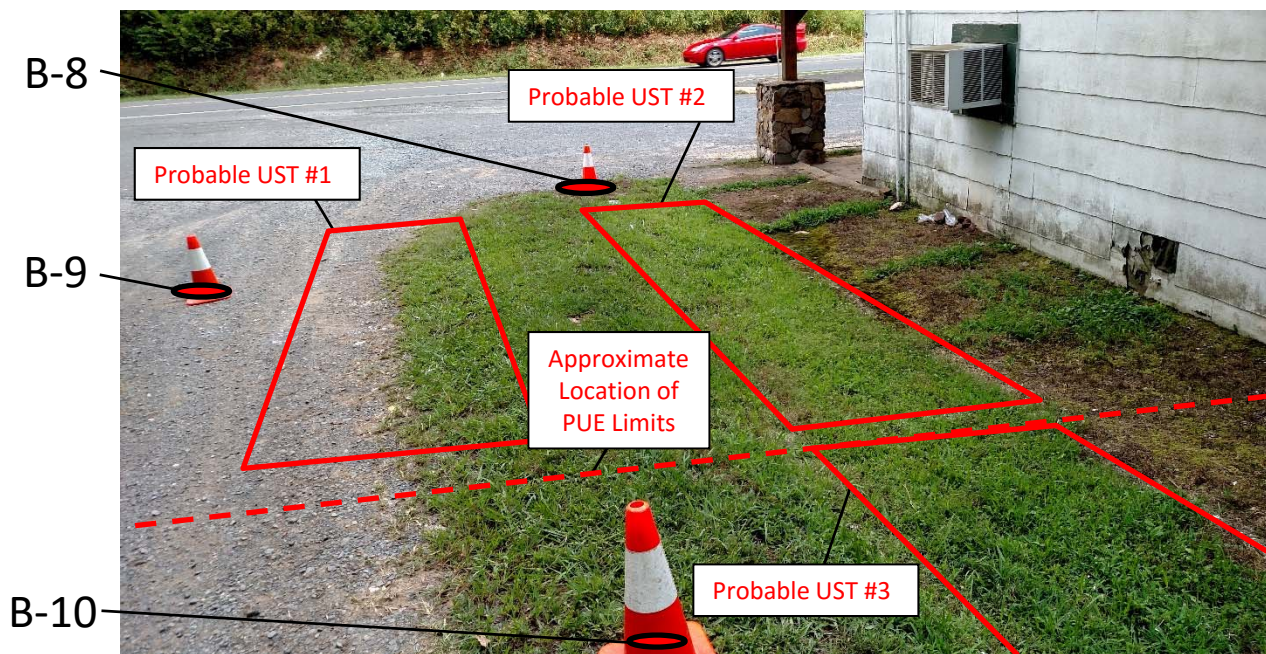


Photo #6: Boring locations B-8, B-9, B-10, and two probable USTs located just northwest of the gas station/restaurant building, facing east.



APPENDIX IV

GEOPROBE LOGS



Boring: P086 B-1 (1 of 1)

Driller: REGIONAL PROBING

GEOPROBE LOG BORING LOGS - COPY.GPJ F&R.GDT 10/17/17



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P086 B-10 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 7.0'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/16/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Moist Brown Silty Sandy Clay			One sample collected for laboratory analysis (6.0-7.0) No odors observed
	2.0		2.0	5.5	
	4.0		4.0	5.5	
	6.0	Moist Gray Brown Silty Sandy Clay	6.0	1.8	
	7.0	Geoprobe Boring Terminated at 7 feet.	7.0	5.9	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P086 B-2 (1 of 1)

Project No: 66V-0092

Elevation: EXISTING

Drilling Method: DIRECT PUSH

Client: NCDOT

Total Depth: 5.5'

Hammer Type: Automatic

Project: R2530B PSAs

Boring Location: SEE BORING LOCATION PLAN **Date Drilled:** 8/16/17

City/State: ALBEMARLE, NC

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Moist Gray Brown Silty Sandy Clay			One sample collected for laboratory analysis (2.0-4.0)
	2.0	Moist Gray Silty Sandy Clay	2.0	3.4	No petroleum odors observed.
	4.0	Dry to Moist Silty Sandy Clay	4.0	4.3	
	5.5	Geoprobe Boring Terminated by Direct Push Refusal at 5.5 feet.	5.5	3.8	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P086 B-3 (1 of 1)

Project No: 66V-0092

Elevation: EXISTING

Drilling Method: DIRECT PUSH

Client: NCDOT

Total Depth: 7.0'

Hammer Type: Automatic

Project: R2530B PSAs

Boring Location: SEE BORING LOCATION PLAN **Date Drilled:** 8/16/17

City/State: ALBEMARLE, NC

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Moist Gray Silty Clay			One sample collected for laboratory analysis (2.0-4.0) No petroleum odors observed.
	2.0	Moist Brown Tan Silty Clay	2.0	4.9	
	4.0		4.0	6.3	
	6.0		6.0	4.0	
	7.0	Geoprobe Boring Terminated by Direct Push Refusal at 7 feet.	7.0	4.8	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P086 B-4 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 7.0'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/16/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Moist Red Orange Silty Clay with Pebbles			One sample collected for laboratory analysis (2.0-4.0) No petroleum odors observed.
	2.0	Moist Grey Clay with Pebbles	2.0	5.6	
	4.0	Moist Tan Silty Sandy Clay	4.0	6.0	
	6.0	Moist Tan Gray Silty Sandy Clay	6.0	5.3	
	7.0	Geoprobe Boring Terminated at 7 feet.	7.0	4.7	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P086 B-5 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 7.5'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/15/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Moist Gray Silty Sandy Clay			One sample collected for laboratory analysis (6.0-7.5) No petroleum odors observed.
	2.0	Wet Tan Brown Silty Clay	2.0	2.0	
	4.0	Moist to Wet Tan Brown Silty Clay	4.0	2.4	
	6.0	Moist Gray Brown Silty Sandy Clay	6.0	2.1	
	7.5	Geoprobe Boring Terminated by Direct Push Refusal at 7.5 feet.	7.5	3.5	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P086 B-6 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 9.5'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/16/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Moist Gray Silty Sandy Clay			One sample collected for laboratory analysis (2.0-4.0) No petroleum odors observed.
	2.0	Moist Gray Silty Sandy Clay with Gravel	2.0	5.2	
	4.0	Wet Tan Brown Silty Clay	4.0	5.8	
	6.0	Moist Tan Brown Silty Clay	6.0	4.2	
	8.0		8.0	4.5	
	9.5	Geoprobe Boring Terminated by Direct Push Refusal at 9.5 feet.	9.5	4.5	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P086 B-7 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 10.0'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/16/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Moist Brown Silty Sandy Clay			One sample collected for laboratory analysis (0.0-2.0) No petroleum odors observed.
	2.0	Moist Orange Brown Silty Sandy Clay	2.0	5.9	
	4.0	Moist Orange Brown Silty Clay	4.0	4.4	
	6.0	Moist Orange Brown Silty Sand	6.0	4.6	
	8.0		8.0	5.2	
	10.0	Geoprobe Boring Terminated at 10 feet.	10.0	5.1	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P086 B-8 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 6.0'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/16/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
		Moist Brown Gray Silty Sandy Clay			One sample collected for laboratory analysis (4.0-6.0) Petroleum odor at 5ft
	2.0		2.0	4.4	
	4.0		4.0	7.5	
	6.0	Geoprobe Boring Terminated by Direct Push Refusal at 6 feet.	6.0	500	



FROEHLING & ROBERTSON, INC.

GEOPROBE LOG

Boring: P086 B-9 (1 of 1)

Project No: 66V-0092

Client: NCDOT

Project: R2530B PSAs

City/State: ALBEMARLE, NC

Elevation: EXISTING

Total Depth: 6.0'

Boring Location: SEE BORING LOCATION PLAN

Drilling Method: DIRECT PUSH

Hammer Type: Automatic

Date Drilled: 8/16/17

Driller: REGIONAL PROBING

Elevation	Depth	Description of Materials (Classification)	*Sample Depth (feet)	PID (ppm)	Remarks
	2.0	Moist Brown Silty Sandy Clay with Stone	2.0	4.8	One sample collected for laboratory analysis (2.0-4.0) No petroleum odors observed.
	4.0	Moist Gray Brown Silty Sandy Clay with Stone	4.0	5.0	
	6.0	Geoprobe Boring Terminated by Direct Push Refusal at 6 feet.	6.0	3.8	



APPENDIX V

LABORATORY ANALYTICAL RESULTS



Hydrocarbon Analysis Results

Client: F&R
Address: 310 HUBERT ST
RALEIGH NC

Samples taken
Samples extracted
Samples analysed

Wednesday, August 16, 2017
Wednesday, August 16, 2017
Friday, August 18, 2017

Contact: BEN WHITLEY

Operator

NICK HENDRIX

Project: NCDOT-R2530B-P086

H09382

Matrix	Sample ID	Dilution used	BTX (C6 - C9)	GRO (C5 - C10)	DRO (C10 - C35)	TPH (C5 - C35)	Total Aromatics (C10-C35)	16 EPA PAHs	BaP	% Ratios			HC Fingerprint Match
										C5 - C10	C10 - C18	C18	
s	P086-B1 (0-2)	3756.0	<93.9	<93.9	2251	2251	1124	59.6	<3.8	0	69.6	30.4	V.Deg.PHC 76.6%,(FCM)
s	P086-B8 (4-6)	37.1	<0.93	13.1	34.7	47.8	15.7	0.79	<0.037	50.4	38.9	10.7	Deg.PHC 84.7%,(FCM),(P)
s	P086-B9 (2-4)	36.6	<0.92	<0.92	2.1	2.1	1.6	<0.29	<0.037	0	68	32	V.Deg.PHC 75.2%,(FCM),(P)
s	P086-B10 (6-7)	22.2	<0.56	<0.56	<0.56	<0.56	<0.11	<0.18	<0.022	0	58	42	PHC not detected
s	P086-B2 (2-4)	34.7	<0.87	<0.87	6.4	6.4	3.9	<0.28	<0.035	0	73.6	26.4	V.Deg.PHC 76.9%,(FCM),(BO),(P)
s	P086-B3 (2-4)	38.8	<0.97	<0.97	0.97	0.97	0.82	<0.31	<0.039	0	72.9	27.1	V.Deg.PHC 75%,(FCM),(BO),(P)
s	P086-B4 (2-4)	37.1	<0.93	<0.93	12	12	6.2	<0.3	<0.037	0	77.2	22.8	Deg.PHC 75.7%,(FCM),(BO)
s	P086-B5 (6-7.5)	39.4	<0.98	<0.98	0.98	0.98	0.55	<0.32	<0.039	0	41.5	58.5	Residual HC,(BO),(P)
s	P086-B6 (2-4)	35.6	<0.89	<0.89	37.7	37.7	26.1	1.3	<0.046	0	74.4	25.6	V.Deg.PHC 77%,(FCM),(BO),(P)
s	P086-B7 (0-2)	38.8	<0.97	<0.97	28.7	28.7	28.5	1.5	<0.058	0	67.6	32.4	V.Deg.PHC 72.5%,(FCM),(BO),(P)
Initial Calibrator QC check			OK		Final FCM QC Check			OK		98.8 %			

Concentration values in mg/kg for soil samples and mg/L for water samples. Soil values uncorrected for moisture or stone content. Fingerprints provide a tentative hydrocarbon identification.

Abbreviations :- FCM = Results calculated using Fundamental Calibration Mode : % = confidence of hydrocarbon identification : (PFM) = Poor Fingerprint Match : (T) = Turbid : (P) = Particulate detected

B = Blank Drift : (SBS)/(LBS) = Site Specific or Library Background Subtraction applied to result : (BO) = Background Organics detected : (OCR) = Outside cal range : (M) = Modified Result.

% Ratios estimated aromatic carbon number proportions : HC = Hydrocarbon : PHC = Petroleum HC : FP = Fingerprint only. **Data generated by HC-1 Analyser**

